

Study Guide

For use with pages 182–186

GOAL**Write equivalent fractions.****VOCABULARY**

Two fractions that represent the same number are called **equivalent fractions**.

A fraction is in **simplest form** when its numerator and its denominator are relatively prime.

EXAMPLE 1**Writing Equivalent Fractions**

Write two fractions that are equivalent to $\frac{18}{27}$.

Multiply or divide the numerator and the denominator by the same nonzero number.

$$\frac{18}{27} = \frac{18 \cdot 2}{27 \cdot 2} = \frac{36}{54} \quad \text{Multiply numerator and denominator by 2.}$$

$$\frac{18}{27} = \frac{18 \div 9}{27 \div 9} = \frac{2}{3} \quad \text{Divide numerator and denominator by 9.}$$

Answer: The fractions $\frac{36}{54}$ and $\frac{2}{3}$ are equivalent to $\frac{18}{27}$.

Exercises for Example 1

Write two fractions that are equivalent to the given fraction.

1. $\frac{8}{10}$

2. $\frac{5}{45}$

3. $\frac{33}{54}$

4. $\frac{24}{36}$

EXAMPLE 2**Writing a Fraction in Simplest Form**

Write $\frac{45}{75}$ in simplest form.

Write the prime factorizations of the numerator and denominator.

$$45 = 3^2 \cdot 5 \quad 75 = 3 \cdot 5^2$$

The GCF of 45 and 75 is $3 \cdot 5 = 15$.

$$\begin{aligned} \frac{45}{75} &= \frac{45 \div 15}{75 \div 15} && \text{Divide numerator and denominator by GCF.} \\ &= \frac{3}{5} && \text{Simplify.} \end{aligned}$$

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EXAMPLE 3 Simplifying a Fraction

The average number of days with precipitation of 0.01 inch or more for San Francisco, California, for the month of April is 6. Write the fraction, in simplest form, of the days in April in San Francisco that have at least 0.01 inch of precipitation, on average.

Solution

$$\begin{aligned} \frac{\text{Number of days with at least 0.01 in. precipitation}}{\text{Total number of days in April}} &= \frac{6}{30} && \text{Write fraction.} \\ &= \frac{6 \div 6}{30 \div 6} && \text{Divide numerator and denominator by GCF, 6.} \\ &= \frac{1}{5} && \text{Simplify.} \end{aligned}$$

Answer: On average, $\frac{1}{5}$ of the days in April in San Francisco have at least 0.01 inch of precipitation.

Exercises for Examples 2 and 3

Write the fraction in simplest form.

5. $\frac{8}{12}$

6. $\frac{20}{25}$

7. $\frac{18}{81}$

8. $\frac{27}{36}$

EXAMPLE 4 Simplifying a Variable Expression

Write $\frac{36x^5y^3}{42xy^4}$ in simplest form.

$$\begin{aligned} \frac{36x^5y^3}{42xy^4} &= \frac{2^2 \cdot 3^2 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y}{2 \cdot 3 \cdot 7 \cdot x \cdot y \cdot y \cdot y \cdot y} && \text{Factor numerator and denominator.} \\ &= \frac{\overset{2}{\cancel{2}} \cdot \overset{3}{\cancel{3}} \cdot \overset{1}{\cancel{x}} \cdot x \cdot x \cdot x \cdot x \cdot \overset{1}{\cancel{y}} \cdot \overset{1}{\cancel{y}} \cdot \overset{1}{\cancel{y}}}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{3}} \cdot 7 \cdot \underset{1}{\cancel{x}} \cdot \underset{1}{\cancel{y}} \cdot \underset{1}{\cancel{y}} \cdot \underset{1}{\cancel{y}} \cdot y} && \text{Divide out common factors.} \\ &= \frac{6x^4}{7y} && \text{Simplify.} \end{aligned}$$

Exercises for Example 4

Write the fraction in simplest form.

9. $\frac{24xy^7}{60x^2y^3}$

10. $\frac{14x^2}{49x^6y}$

11. $\frac{32x^5y^5}{64x^2y^3}$

12. $\frac{30xy}{35x^2}$